

REMARKS

Claims 11 and 14-17 are pending. Claim 11 is amended. The amendment is supported by paragraph 0026, and Examples 1, 3 and 4 of the present application.

The 35 U.S.C. § 103(a) rejections

The following rejections are pending:

- (A) Claims 11, 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamakawa et al, US 2002/0034686 A1 in view of Nissen et al, US 6,341,057 B1; and
- (B) Claims 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamakawa et al. in view of Nissen et al. as applied to claim 11, and further in view of Kasuke, JP 08-107047.

Applicants respectfully traverse the rejections.

In order to further distinguish the present invention from the teachings of Yamakawa et al, Nissen et al. and Kasuke, Applicants have amended claim 11 so that the electric double layer capacitor comprises a binder, wherein the binder comprises monomer units (b) derived from *acrylonitrile*.

In **Yamakawa et al**, acrylonitrile units are excluded from the structural unit of the copolymer binder. Thus, Yamakawa et al *teach away* from the inventive electric double layer capacitor having acrylonitrile units as the structural units of the binder.

A reference which leads one of ordinary skill in the art away from the claimed invention cannot render it unpatentably obvious. *Dow Chem. Co. v. American Cyanamid Co.* 816 F2d 617, (CAFC 1987). In determining the scope and content of the prior art, and determining whether the prior art suggested the claimed invention, the references "must be read as a whole and consideration must be given where the references diverge and teach away from the claimed invention." *Akzo N.V. v. United States Int'l Trade Comm'n*, 1 USPQ2d 1241, 1246 (Fed. Cir. 1986); *In re Fine*, 5 USPQ2d 1596, 1598-99 (Fed. Cir. 1988). Known disadvantages in old devices which would naturally discourage the search for new inventions may be taken into account in determining obviousness. *United States v. Adams*, 383, U.S. 39, 52 (1966).

Here, there are known disadvantages in the old devices incorporating acrylonitrile which would be taken into account by the skilled artisan and are of such a nature as would discourage the skilled artisan from using acrylonitrile in the binder for the electric double layer capacitor. The Examiner will note that Yamakawa et al. actually compare the use of acrylonitrile with methacrylonitrile in the experiments. Substantially, the only difference between inventive example 1 and comparative example 1 is that inventive example 1 incorporates methacrylonitrile in the binder whereas comparative example 1 incorporates acrylonitrile into the binder. As the Examiner will note from the data in Table 1 on page 9 of Yamakawa et al, comparative example 1 (using acrylonitrile) shows a much lower electrochemical stability than inventive example 1 (using methacrylonitrile). This can be seen in the CV value for inventive example 1 (using methacrylonitrile) which was $54 \mu\text{A}/\text{cm}^2$ whereas the CV value for comparative example 1 (using acrylonitrile) rose to an undesirable $169 \mu\text{A}/\text{cm}^2$. Also, comparative example 1 (using acrylonitrile) shows a much lower retention of capacity than inventive example 1 (using methacrylonitrile). This can be seen in the retention of capacity at repetition of charge-discharge cycles at a higher temperature (in the bottom row of Table 1). Inventive example 1 (using methacrylonitrile) showed a retention of 78% whereas the retention value for comparative example 1 (using acrylonitrile) was reduced to an undesirable 35%.

Applicants respectfully submit that the present inventors have surprisingly found a way to obtain a battery with acrylonitrile in the binder (in the capacitor) that is comparable in initial discharge capacity and in discharge capacity after 100 hours at 70°C to batteries with methacrylonitrile in the binder (in the capacitor). As can be seen from example 2 (using methacrylonitrile) of the present specification, the initial discharge capacity was 17.2 mWh/s. It is surprising to note that the initial discharge capacity for example 4 (using acrylonitrile) of the present specification did not precipitously drop as would be expected based on the teachings of Yamakawa et al. In fact, the initial discharge capacity for example 4 (using acrylonitrile) of the present specification was 17.8 mWh/s. Likewise, it is surprising to note that the discharge capacity after 100 hours at 70°C for example 4 (using acrylonitrile) of the present specification did not precipitously drop as would be expected based on the teachings of Yamakawa et al. In fact, the discharge capacity after 100 hours at 70°C for example 4 (using acrylonitrile) of the present specification

was 16.1 mWh/s whereas the discharge capacity after 100 hours at 70°C for example 2 (using methacrylonitrile) of the present specification was 16.3 mWh/s.

Applicants respectfully submit that based on the teachings of Yamakawa et al., the artisan would expect that the data for example 4 (using acrylonitrile) of the present specification would be significantly worse than the data for example 2 (using methacrylonitrile) of the present specification. As such, the data shows that the present invention using acrylonitrile has *unexpected* levels of properties when the teachings of Yamakawa et al. are taken into consideration. As such, even if a *prima facie* case of obviousness were to exist (which Applicants do not concede), these unexpected properties overcome the *prima facie* case.

Turning to Nissen et al., Nissen et al only disclose that the binder is selected from the group consisting of melamine resins, polyvinyl butyrals and fluorocontaining polymers (See paragraph 5, lines 19-23). Thus, Nissen et al does not describe or hint at the binder of the present invention and Nissen et al. do not cure the deficiencies of Yamakawa et al.

Furthermore, the Examiner cites Kasuke for teaching certain carbonaceous materials. As such, Kasuke does not cure the deficiencies of Nissen et al and Yamakawa et al.

Therefore, the present invention is not obvious over the cited references. Reconsideration and withdrawal of the rejections are respectfully requested.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Garth M. Dahlen, Ph.D., Esq., Reg. No. 43,575, at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

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